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# Wikidata Documentation

*Release 0.7.0*

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This package provides easy APIs to use [Wikidata](#) for Python.

```
>>> from wikidata.client import Client
>>> client = Client() # doctest: +SKIP
>>> entity = client.get('Q20145', load=True)
>>> entity
<wikidata.entity.Entity Q20145 'IU'>
>>> entity.description
m'South Korean singer and actress'
>>> image_prop = client.get('P18')
>>> image = entity[image_prop]
>>> image
<wikidata.commonsmmedia.File 'File:KBS "The Producers" press conference, 11 May 2015_
↪10.jpg'>
>>> image.image_resolution
(820, 1122)
>>> image.image_url
'https://upload.wikimedia.org/wikipedia/commons/6/60/KBS_%22The_Producers%22_press_
↪conference%2C_11_May_2015_10.jpg'
```



## 1.1 wikidata.cache — Caching policies

Changed in version 0.5.0.

`wikidata.cache.CacheKey(x)`

The type of keys to look up cached values. Alias of `str`.

**class** `wikidata.cache.CachePolicy`

Interface for caching policies.

**get** (*key*: *NewType.<locals>.new\_type*) → *Optional*[*NewType.<locals>.new\_type*]

Look up a cached value by its key.

**Parameters** **key** (*CacheKey*) – The key string to look up a cached value.

**Returns** The cached value if it exists. *None* if there's no such key.

**Return type** *Optional*[*CacheValue*]

**set** (*key*: *NewType.<locals>.new\_type*, *value*: *Optional*[*NewType.<locals>.new\_type*]) → *None*

Create or update a cache.

**Parameters**

- **key** (*CacheKey*) – A key string to create or update.
- **value** (*Optional*[*CacheValue*]) – A value to cache. *None* to remove cache.

`wikidata.cache.CacheValue(x)`

The type of cached values.

**class** `wikidata.cache.MemoryCachePolicy(max_size: int = 128)`

LRU (least recently used) cache in memory.

**Parameters** **max\_size** (*int*) – The maximum number of values to cache. 128 by default.

**get** (*key*: *NewType.<locals>.new\_type*) → *Optional*[*NewType.<locals>.new\_type*]

Look up a cached value by its key.

**Parameters** **key** (*CacheKey*) – The key string to look up a cached value.

**Returns** The cached value if it exists. None if there's no such key.

**Return type** *Optional[CacheValue]*

**set** (*key: NewType.<locals>.new\_type, value: Optional[NewType.<locals>.new\_type]*) → None  
Create or update a cache.

**Parameters**

- **key** (*CacheKey*) – A key string to create or update.
- **value** (*Optional[CacheValue]*) – A value to cache. None to remove cache.

**class** `wikidata.cache.NullCachePolicy`

No-op cache policy.

**get** (*key: NewType.<locals>.new\_type*) → *Optional[NewType.<locals>.new\_type]*  
Look up a cached value by its key.

**Parameters** **key** (*CacheKey*) – The key string to look up a cached value.

**Returns** The cached value if it exists. None if there's no such key.

**Return type** *Optional[CacheValue]*

**set** (*key: NewType.<locals>.new\_type, value: Optional[NewType.<locals>.new\_type]*) → None  
Create or update a cache.

**Parameters**

- **key** (*CacheKey*) – A key string to create or update.
- **value** (*Optional[CacheValue]*) – A value to cache. None to remove cache.

**class** `wikidata.cache.ProxyCachePolicy` (*cache\_object, timeout: int, property\_timeout: Optional[int] = None, namespace: str = 'wd\_'*)

This proxy policy is a proxy or an adaptor to another cache object. Cache objects can be anything if they satisfy the following interface:

```
def get(key: str) -> Optional[bytes]: pass
def set(key: str, value: bytes, timeout: int=0) -> None: pass
def delete(key: str) -> None: pass
```

(The above methods omit `self` parameters.) It's compatible with de facto interface for caching libraries in Python (e.g. `python-memcached`, `werkzeug.contrib.cache`).

**Parameters**

- **cache\_object** – The cache object to adapt. Read the above explanation.
- **timeout** (*int*) – Lifespan of every cache in seconds. 0 means no expiration.
- **property\_timeout** (*int*) – Lifespan of caches for properties (in seconds). Since properties don't change frequently or their changes usually don't make important effect, longer lifespan of properties' cache can be useful. 0 means no expiration. Set to the same as `timeout` by default.
- **namespace** (*str*) – The common prefix attached to every cache key. 'wd\_' by default.

**get** (*key: NewType.<locals>.new\_type*) → *Optional[NewType.<locals>.new\_type]*  
Look up a cached value by its key.

**Parameters** **key** (*CacheKey*) – The key string to look up a cached value.

**Returns** The cached value if it exists. None if there's no such key.



**Return type** `Optional[CacheValue]`

**set** (*key*: `NewType.<locals>.new_type`, *value*: `Optional[NewType.<locals>.new_type]`) → `None`  
Create or update a cache.

#### Parameters

- **key** (`CacheKey`) – A key string to create or update.
- **value** (`Optional[CacheValue]`) – A value to cache. `None` to remove cache.

## 1.2 wikidata.client — Client session

`wikidata.client.WIKIDATA_BASE_URL = 'https://www.wikidata.org/'`  
(`str`) The default `base_url` of `Client` constructor.

Changed in version 0.3.0: As the meaning of `Client` constructor's `base_url` parameter, it now became to `https://www.wikidata.org/` from `https://www.wikidata.org/wiki/` (which contained the trailing path `wiki/`).

```
class wikidata.client.Client (base_url: str = 'https://www.wikidata.org/', opener: Optional[urllib.request.OpenerDirector] = None, datavalue_decoder: Union[Decoder, Callable[[Client, str, Mapping[str, object]], object], None] = None, entity_type_guess: bool = True, cache_policy: wikidata.cache.CachePolicy = <wikidata.cache.NullCachePolicy object>, repr_string: Optional[str] = None)
```

Wikidata client session.

#### Parameters

- **base\_url** (`str`) – The base url of the Wikidata. `WIKIDATA_BASE_URL` is used by default.
- **opener** (`urllib.request.OpenerDirector`) – The opener for `urllib.request`. If omitted or `None` the default opener is used.
- **entity\_type\_guess** (`bool`) – Whether to guess `type` of `Entity` from its `id` for less HTTP requests. `True` by default.
- **cache\_policy** – A caching policy for API calls. No cache (`NullCachePolicy`) by default.

New in version 0.5.0: The `cache_policy` option.

Changed in version 0.3.0: The meaning of `base_url` parameter changed. It originally meant `https://www.wikidata.org/wiki/` which contained the trailing path `wiki/`, but now it means only `https://www.wikidata.org/`.

New in version 0.2.0: The `entity_type_guess` option.

**cache\_policy** = `<wikidata.cache.NullCachePolicy object>`  
(`CachePolicy`) A caching policy for API calls.

New in version 0.5.0.

**datavalue\_decoder** = `None`

(`Union[Decoder, Callable[[Client, str, Mapping[str, object]], object]]`) The function to decode the given datavalue. It's typically an instance of `Decoder` or its subclass.

**decode\_datavalue** (*datatype*: `str`, *datavalue*: `Mapping[str, object]`) → `object`  
Decode the given datavalue using the configured `datavalue_decoder`.

New in version 0.3.0.

**entity\_type\_guess = True**

(*bool*) Whether to guess *type* of *Entity* from its *id* for less HTTP requests.

New in version 0.2.0.

**get** (*entity\_id*: *NewType.<locals>.new\_type*, *load*: *bool = False*) → *wikidata.entity.Entity*

Get a Wikidata entity by its *EntityId*.

**Parameters**

- **entity\_id** – The *id* of the *Entity* to find.
- **load** (*bool*) – Eager loading on *True*. Lazy loading (*False*) by default.

**Returns** The found entity.

**Return type** *Entity*

New in version 0.3.0: The *load* option.

**guess\_entity\_type** (*entity\_id*: *NewType.<locals>.new\_type*) → *Optional[wikidata.entity.EntityType]*

Guess *EntityType* from the given *EntityId*. It could return *None* when it fails to guess.

---

**Note:** It always fails to guess when *entity\_type\_guess* is configured to *False*.

---

**Returns** The guessed *EntityId*, or *None* if it fails to guess.

**Return type** *Optional[EntityType]*

New in version 0.2.0.

## 1.3 wikidata.commonsmmedia — Wikimedia Commons

New in version 0.3.0.

**class** *wikidata.commonsmmedia.File* (*client*: *wikidata.client.Client*, *title*: *str*)

Represent a file on [Wikimedia Commons](#).

**image\_mimetype**

(*Optional[str]*) The MIME type of the image. It may be *None* if it's not an image.

**image\_resolution**

(*Optional[Tuple[int, int]]*) The (width, height) pair of the image. It may be *None* if it's not an image.

**image\_size**

(*Optional[int]*) The size of the image in bytes. It may be *None* if it's not an image.

**image\_url**

(*Optional[str]*) The image url. It may be *None* if it's not an image.

**page\_url**

(*str*) The canonical url of the page.

**exception** *wikidata.commonsmmedia.FileError*

Exception raised when something goes wrong with *File*.

## 1.4 wikidata.datavalue — Interpreting datavalues

This module provides the decoder interface for customizing how datavalues are decoded, and the default *Decoder* implementation.

Technically the interface is just a callable so that its implementation doesn't necessarily have to be an instance of *Decoder* or its subclass, but only need to satisfy:

```
typing.Callable[[wikidata.client.Client, str, typing.Mapping[str, object]],
                object]
```

New in version 0.3.0.

**exception** `wikidata.datavalue.DatavalueError` (\*args)

Exception raised during decoding datavalues. It subclasses `ValueError` as well.

**datavalue**

The datavalue which caused the decoding error.

**class** `wikidata.datavalue.Decoder`

Decode the given datavalue to a value of the appropriate Python type. For extensibility it uses visitor pattern and is intended to be subclassed. To customize decoding of datavalues subclass it and configure `datavalue_decoder` option of *Client* to the customized decoder.

It automatically invokes an appropriate visitor method using a simple rule of name: `{datatype}__{datavalue[type]}`. For example, if the following call to a decoder was made:

```
decoder(client, 'mydatatype', {'type': 'mytype', 'value': '...'})
```

it's delegated to the following visitor method call:

```
decoder.mydatatype__mytype(client, {'type': 'mytype', 'value': '...'})
```

If a decoder failed to find a visitor method matched to `{datatype}__{datavalue[type]}` pattern it secondly try to find a general version of visitor method: `{datavalue[type]}` which lacks double underscores. For example, for the following call:

```
decoder(client, 'mydatatype', {'type': 'mytype', 'value': '...'})
```

It firstly try to find the following visitor method:

```
decoder.mydatatype__mytype
```

but if there's no such method it secondly try to find the following general visitor method:

```
decoder.mytype
```

This twice-try dispatch is useful when to make a visitor method to be matched regardless of datatype.

If its `datavalue[type]` contains hyphens they're replaced by underscores. For example:

```
decoder(client, 'string',
        {'type': 'wikibase-entityid', 'value': 'a text value'})
```

the above call is delegated to the following visitor method call:

```
decoder.string__wikibase_entityid(
    #     Note that the ^ underscore
    client,
    {'type': 'wikibase-entityid', 'value': 'a text value'})
)
```

## 1.5 wikidata.entity — Wikidata entities

**class** `wikidata.entity.Entity` (*id*: `NewType.<locals>.new_type`, *client*: `Client`)

Wikidata entity. Can be an item or a property. Its attributes can be lazily loaded.

To get an entity use `Client.get()` method instead of the constructor of `Entity`.

---

**Note:** Although it implements `Mapping[EntityId, object]`, it actually is multidict. See also `getlist()` method.

---

Changed in version 0.2.0: Implemented `Mapping[EntityId, object]` protocol for easy access of statement values.

Changed in version 0.2.0: Implemented `Hashable` protocol and `==/=` operators for equality test.

**state**

(`EntityState`) The loading state.

New in version 0.7.0.

**getlist** (*key*: `wikidata.entity.Entity`) → `Sequence[object]`

Return all values associated to the given *key* property in sequence.

**Parameters** *key* (`Entity`) – The property entity.

**Returns** A sequence of all values associated to the given *key* property. It can be empty if nothing is associated to the property.

**Return type** `Sequence[object]`

**lists** () → `Sequence[Tuple[wikidata.entity.Entity, Sequence[object]]]`

Similar to `items()` except the returning pairs have each list of values instead of each single value.

**Returns** The pairs of (*key*, *values*) where *values* is a sequence.

**Return type** `Sequence[Tuple[Entity, Sequence[object]]]`

**type**

(`EntityType`) The type of entity, *item* or *property*.

New in version 0.2.0.

`wikidata.entity.EntityId`(*x*)

The identifier of each `Entity`. Alias of `str`.

**class** `wikidata.entity.EntityState`

Define state of `Entity`.

New in version 0.7.0.

**loaded** = `'loaded'`

(`EntityState`) The entity exists and is already loaded.

**non\_existent** = `'non_existent'`

(`EntityState`) The entity does not exist.

**not\_loaded** = `'not_loaded'`

(`EntityState`) Not loaded yet. Unknown whether the entity does exist or not.

**class** `wikidata.entity.EntityType`

The enumerated type which consists of two possible values:

- *item*

- *property*

New in version 0.2.0.

**item** = 'item'

(*EntityType*) Items are *Entity* objects that are typically represented by Wikipage (at least in some Wikipedia languages). They can be viewed as “the thing that a Wikipage is about,” which could be an individual thing (the person *Albert Einstein*), a general class of things (the class of all *Physicists*), and any other concept that is the subject of some Wikipedia page (including things like *History of Berlin*).

**See also:**

**Items — Wikibase Data Model** The data model of Wikibase describes the structure of the data that is handled in Wikibase.

**property** = 'property'

(*EntityType*) Properties are *Entity* objects that describe a relationship between items (or other *Entity* objects) and values of the property. Typical properties are *population* (using numbers as values), *binomial name* (using strings as values), but also *has father* and *author of* (both using items as values).

**See also:**

**Properties — Wikibase Data Model** The data model of Wikibase describes the structure of the data that is handled in Wikibase.

## 1.6 wikidata.globecoordinate — Globe coordinate

New in version 0.7.0.

**class** wikidata.globecoordinate.GlobeCoordinate (*latitude: float, longitude: float, globe: wikidata.entity.Entity, precision: float*)

Literal data for a geographical position given as a latitude-longitude pair in gms or decimal degrees for the given stellar body.

## 1.7 wikidata.multilingual — Multilingual texts

wikidata.multilingual.Locale (*x*)

The locale of each *MonolingualText* or internal mapping of each *MultilingualText*. Alias of *str*.

New in version 0.7.0.

**class** wikidata.multilingual.MonolingualText

Locale-denoted text. It’s almost equivalent to *str* (and indeed subclasses *str*) except that it has an extra attribute, *locale*, that denotes what language the text is written in.

**locale** = None

(*Locale*) The code of *locale*.

## 1.8 wikidata.quantity — Quantity

New in version 0.7.0.

**class** `wikidata.quantity.Quantity` (*amount: float, lower\_bound: Optional[float], upper\_bound: Optional[float], unit: Optional[wikidata.entity.Entity]*)

A Quantity value represents a decimal number, together with information about the uncertainty interval of this number, and a unit of measurement.

## 2.1 How to run tests

As this project supports various Python interpreters (CPython and PyPy) and versions, to ensure it works well with them, we use `tox`. You don't need to create a virtual environment by yourself. `tox` automatically creates virtual environments for various Python versions and run the same test suite on all of them.

The easiest to install `tox` is to use `pip`<sup>1</sup>:

```
pip install tox
```

Once you've installed `tox`, it's very simple to run the test suite on all Python versions this project aims to support:

```
tox
```

Note that you need to install Python interpreters besides `tox`. If you don't want to install all of them use `--skip-missing-interpreters` option:

```
tox --skip-missing-interpreters
```

To run tests on multiple interpreters at a time, use `--parallel` option:

```
tox --parallel
```

---

<sup>1</sup> See also the `tox`'s official docs.





### 3.1 Version 0.7.0

Released on July 31, 2020.

- Marked the package as supporting type checking by following [PEP 561](#).
- Now non-existent entities became able to be handled. [#11]
  - Added `EntityState` enum class.
  - Added `Entity.state` attribute.
  - Fixed a bug that raised `HTTPError` when non-existent `Entity` was requested.
- Languages (locales) became no more represented as `babel.core.Locale`, but represented `wikidata.multilingual.Locale` instead. [#2, #27, #30 by Nelson Liu]
  - Removed `Babel` from the dependencies.
  - Added `wikidata.multilingual.Locale` type.  
To replace the `babel.core.Locale` type, the `wikidata.multilingual.Locale` type has been aliased to `str`. This is a *breaking change* for all Wikidata public API functions that formerly returned or ingested `babel.core.Locale`.
- Added support for `time` datatypes with precision 9 (year-only). [#26 by Nelson Liu]
- Added support for globe coordinate datatype. [#28 by Nelson Liu]
  - Added support for decoding the `globe-coordinate` datatype.
  - Added `wikidata.globecoordinate` module.
- Added support for quantity datatype. [#29 by Nelson Liu]
  - Added support for decoding the `quantity` datatype.
  - Added `wikidata.quantity` module. [#29]
- Fixed `KeyError` from `Entity.getlist()` if the property is explicitly associated with “no value”. [#18]

- Fixed a bug that raised `KeyError` when accessing an image more than once and `MemoryCachePolicy` was enabled. [#24 by Héctor Cordobés]

## 3.2 Version 0.6.1

Released on September 18, 2017.

- Fixed `ImportError` on Python 3.4 due to lack of `typing` module. [#4]

## 3.3 Version 0.6.0

Released on September 12, 2017.

- Fixed `KeyError` from `Client.get()` on an entity is redirected to its canonical entity.

## 3.4 Version 0.5.4

Released on September 18, 2017.

- Fixed `ImportError` on Python 3.4 due to lack of `typing` module. [#4]

## 3.5 Version 0.5.3

Released on June 30, 2017.

- Fixed `ValueError` from `Entity.label/Entity.description` with languages `ISO 639-1` doesn't cover (e.g. `cbk-zam`). [#2]

Although this fix prevents these properties from raising `ValueError`, it doesn't completely fix the problem. `babel.core.Locale` type, which Wikidata depends on, currently doesn't support languages other than `ISO 639-1`. In order to completely fix the problem, we need to patch `Babel` to support them, or make Wikidata independent from `Babel`.

## 3.6 Version 0.5.2

Released on June 28, 2017.

- Fixed `AssertionError` from empty `multilingual_attributes`.

## 3.7 Version 0.5.1

Released on June 28, 2017.

- Fixed `AssertionError` from `len()` or iterating (`iter()`) on `Entity` objects with empty claims.

## 3.8 Version 0.5.0

Released on June 13, 2017.

- Wikidata API calls over network became possible to be cached.
  - `Client` now has `cache_policy` attribute and constructor option. Nothing is cached by default.
  - Added `wikidata.cache` module and `CachePolicy` interface in it. Two built-in implementation of the interface were added:
    - `NullCachePolicy` No-op.
    - `MemoryCachePolicy` LRU cache in memory.
    - `ProxyCachePolicy` Proxy/adapter to another proxy object. Useful for utilizing third-party cache libraries.
  - `wikidata.client.Client.request` logger became to record logs about cache hits as `DEBUG` level.

## 3.9 Version 0.4.4

Released on June 30, 2017.

- Fixed `ValueError` from `Entity.label/Entity.description` with languages `ISO 639-1` doesn't cover (e.g. `cbk-zam`). [#2]
- Although this fix prevents these properties from raising `ValueError`, it doesn't completely fix the problem. `babel.core.Locale` type, which Wikidata depends on, currently doesn't support languages other than `ISO 639-1`. In order to completely fix the problem, we need to patch `Babel` to support them, or make Wikidata independent from `Babel`.

## 3.10 Version 0.4.3

Released on June 28, 2017.

- Fixed `AssertionError` from empty `multilingual_attributes`.

## 3.11 Version 0.4.2

Released on June 28, 2017.

- Fixed `AssertionError` from `len()` or iterating (`iter()`) on `Entity` objects with empty claims.

## 3.12 Version 0.4.1

Released on April 30, 2017.

- Fixed `AssertionError` from `getlist()` on entities with empty claims.

### 3.13 Version 0.4.0

Released on April 24, 2017.

- Monolingual texts became able to be handled.
  - Added *MonolingualText* type which is a true subtype of *str*.

### 3.14 Version 0.3.0

Released on February 23, 2017.

- Now *Client* became able to customize how it decodes datavalues to Python objects.
  - Added *wikidata.datavalue* module and *Decoder* class inside it.
  - Added *datavalue\_decoder* option to *Client*.
- Now files on Wikimedia Commons became able to be handled.
  - New decoder became able to parse Wikimedia Commons files e.g. images.
  - Added *wikidata.commonsmidia* module and *File* class inside it.
- The meaning of *Client* constructor's *base\_url* parameter became not to contain the trailing path *wiki/* from *https://www.wikidata.org/wiki/*. As its meaning changed, the value of *WIKIDATA\_BASE\_URL* constant also changed to not have the trailing path.
- Added *load* option to *Client.get()* method.

### 3.15 Version 0.2.0

Released on February 19, 2017.

- Made *Entity* multidict. Now it satisfies *Mapping[Entity, object]* protocol.
- Added *Entity.type* property and *EntityType* enum class to represent it.
- Added *entity\_type\_guess* option and *guess\_entity\_type()* method to *Client* class.
- Implemented *Hashable* protocol and *==/=* operators to *Entity* for equality test.

### 3.16 Version 0.1.0

Initial version. Released on February 15, 2017.

## CHAPTER 4

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### Indices and tables

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